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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,517	01/03/2002	Don Carl Powell	MIO 0059 V2	3647

7590 06/04/2003

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EXAMINER
LE, DUNG ANH

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No.	Applicant(s)	
	10/039,517	POWELL ET AL.	
	Examiner	Art Unit	
	DUNG/A LE	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Election dated 3/11/2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-74* is/are pending in the application.

4a) Of the above claim(s) *1-31 and 43-74* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restriction

Applicant's election **with traverse** of claims 32- 42 in Paper No. 7 is acknowledged.

RESPONSE TO SPECIES ELECTION OF APPLICANTS

This Office Action is responded to the RESPONSE TO SPECIES ELECTION OF APPLICANTS mailed on 3/11/2003 in Paper No. 7. In that RESPONSE TO SPECIES ELECTION Applicants elected to have the claims of Species III (Claims 32- 42): Device with Silicon-containing barrier for examination in this Office Action.

This election is made WITH TRAVERSE.

The Applicants' Proposed restriction is not acceptable for following reasons:

Claims 30- 74 are pending in this application. Applicants added new Claims 33-74 in order to generate 16 Species as disclosed in latest Office Action dated 2/19/2003.

This application contains claims directed to the following patentably distinct species of the claimed invention:

a) Species I, e.g. claims 30, 48 : Capacitor device with nitride silicon-containing barrier layer.

b) Species II, e.g. claim 31: Computer system. See fig. 5

c) Species III, e.g. claims 32-39, 40, 41, 42: Device with a silicon-containing barrier.

d) Species IV, e.g. claims 43- 47: A semiconductor device with transistor structure having a silicon-containing barrier layer.

e) Species V, e.g. claim 49, A semiconductor device having a silicon-containing barrier layer containing no metal forming from silicon source.

f) Species VI, e.g. claim 50, A semiconductor device having a silicon-containing barrier layer containing no metal forming from silazane source.

g) Species VII, e.g. claim 51 A semiconductor device with transistor structure having a barrier layer containing no metal.

h) Species VIII, e.g. claims 52, A Capacitor device with barrier layer containing no metal using rapid thermal nitridation with a nitridizing reactant.

i) Species IX, e.g. claims 53- 60, Capacitor device with nitride silicon-containing barrier layer from silicon source.

j) Species X, e.g. claims 61-64 : A device having a precursor layer with a metal-free silicon- containing material formed over at least a portion of first semiconductor device.

k) Species XI, e.g. claim 65, A device having a precursor layer with a metal-free silicon- containing material formed over at least a portion of silicon substrate .

l) Species X, e.g. claim 66: A semiconductor device having a precursor layer metal-free silicon-containing material forming from silicon source.

l) Species XI, e.g. claim 67: A semiconductor device having a precursor layer metal-free silicon-containing material forming from silazane source.

m) Species XII, e.g. claims 68- 71. A semiconductor device with transistor structure having a metal-free containing precursor layer.

n) Species XIII, e.g. claims 72-73, A capacitor having a precursor layer forming over a electrode from a metal-free silicon-containing material from a silazane source

o) Species XIV, e.g. claim 74, A capacitor having a precursor layer forming over a electrode from a metal-free silicon-containing material from a silane source.

The Examiner believes the sixteen different species to be logical and compliant with the guidelines of the M.P.E.P.

Numerous species are clearly mutually exclusive. For example, a) Species I, e.g. claims 30, 48: Capacitor device with nitride silicon-containing barrier layer, which is different species compare with b) Species II, e.g. claim 3 1: Computer system. See Fig. 5. Another example, C) Species III, e.g. claims 32-3)9, 40, 41 and 42: Device with a silicon-containing barrier, which is different Species compare with d) Species IV, e.g- claims 43-47: A semiconductor device with transistor structure having a silicon-containing barrier layer and further on.

Accordingly, Examiner believes that the restriction is proper and recommend that the Applicants cancel the non- elective claims. Moreover, claims are restricted to different species recite the mutually exclusive characteristics of such species.

The requirement is still deemed proper and is therefore made **FINAL**.

Claim Rejections

Claim Rejections - 35 USC § 112

Claims 32, 40 and 42 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The applicant(s) is reminded that the presence of process limitations on product claims, which product does not otherwise patentability distinguish over prior, cannot impart patentability to the product. In re Stepens 145 USPQ 656 (CCPA 1965). **The process step in claim 32**, a barrier layer formed from a silicon source previously deposited over at least a portion of the semiconductor device, having been reacted with a reactive agent, **the process step in claim 40**, a silicon-containing material, previously formed over at least a portion of said first semiconductor device, that has been reacted with a reactive agent to form a barrier layer and **the process step in claim 42**, a silicon-containing material from a silazane source, previously formed over at least a portion of said silicon substrate, that has been reacted with a reactive ambient to form said barrier layer.

The remaining claims are dependent from the above rejected claims and therefore also considered indefinite.

Claim Rejections

Set of claims 32-39.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 32- 39 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of the following remark.

Huang et al. teach a device comprising:

a substrate100 including at least one semiconductor layer 120;

a semiconductor device fabricated proximate to the substrate; and

a barrier layer130 is made off silicon nitride with the use of SiH4 and reactive gas NH3.

Huang et al. do not disclose "a barrier formed a silicon source previously deposited over at least a portion of the semiconductor device, having been reacted with a reactive agent" in claim 32. However, the limitation "having been reacted with a reactive agent " is taken to be a product by process limitation and consider non-limitation. In a

product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Regarding claims 33 and 34, Huang discloses the claimed invention except for , wherein the silicon source is a silazane and the silicon source is selected from the group comprising hexamethyldisilazane, tetramethyldisilazane, octamethylcyclotetrasilazine, hexamethylcyclotrisilazine, diethylarninotrimethylsilane and dimethylaminotrimethylsilane as cited in claims 33 and 34. It would have been obvious to

one having ordinary skill in the art at the time the invention was made to form the silicon-containing barrier layer is made of abovementioned materials which are commonly used to prevent undesirable reactions in the contact region, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Regarding claim 35, wherein the silicon-containing material is from a silane source (col 4, line 8).

Regarding claim 36,, wherein the reactive agent is selected from the group comprising NH3, N2, 02, 03, N20 and NO (col 4, line 8).

Regarding claim 37, wherein the barrier layer is primarily nitride (col 4, line 4).

Regarding claim 38 and 39, Huang discloses the claimed invention except for wherein the barrier layer is primarily oxide and the barrier layer is primarily oxynitride as cited in claims 38 and 38. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the silicon-containing barrier layer is made of oxide or oxynitride which is commonly used to prevent undesirable reactions in the contact region, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Set of claims 40-41.

Claims 40-41 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of the following remark.

Huang et al. disclose a device having a barrier layer comprising:

a substrate100 including at least one semiconductor layer 120;

a first semiconductor device fabricated proximate to said substrate 100;

a silicon-containing material SiH4 and NH3 are mixed to form barrier 130,

a second semiconductor device 140 formed over said barrier layer 130.

Huang et al. do not disclose "a silicon-containing material, previously formed over at least a portion of said first semiconductor device, that has been reacted with a reactive agent to form a barrier layer " in claim 40. However, the limitation "formed over at least a portion of said first semiconductor device, that has been reacted with a reactive agent to form a barrier layer " is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao,

190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Regarding claim 41, wherein the reactive agent is NH3 and the barrier layer is primarily nitride (col 4, line 8).

Claim 42.

Claim 42 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of the following remarks.

Huang et al. teach a device having a barrier layer comprising:

a silicon substrate including at least one semiconductor layer;

a silicon-containing material from a silane source and NH4 to form barrier layer (col 4, line 8).

Huang do not disclose a silicon-containing material from a silazane source the claimed invention except for wherein the barrier layer is primarily oxide and the barrier layer is primarily oxynitride as cited. It would have been obvious to one having

ordinary skill in the art at the time the invention was made to form the silicon-containing barrier layer by utilized the silazane source which is commonly used silicon source to prevent undesirable reactions in the contact region, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Huang et al. do not disclose "a silicon-containing material, previously formed over at least a portion of said silicon substrate, that has been reacted with a reactive ambient to form said barrier layer" in claim 42. However, the limitation "previously formed over at least a portion of said silicon substrate, that has been reacted with a reactive ambient to form said barrier layer " is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it

clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is 703-306-5797. The examiner can normally be reached on Monday-Friday 8:00am-5: 30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 703-308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Dung A. Le
Examiner